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Yamada et al.

(10) **Patent No.: US 9,245,275 B2**
(45) **Date of Patent: Jan. 26, 2016**

(54) **RELEVANCE ANALYSIS DEVICE, RELEVANCE ANALYSIS METHOD, AND RELEVANCE ANALYSIS PROGRAM**

(75) Inventors: **Hideo Yamada**, Okazaki (JP); **Ryuya Muramatsu**, Okazaki (JP)

(73) Assignee: **AISIN AW CO., LTD.**, Anjo (JP)

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G06F 17/30 (2006.01)
G06Q 30/02 (2012.01)
G06Q 10/10 (2012.01)

(52) **U.S. Cl.**
CPC ***G06Q 30/02*** (2013.01); ***G06Q 10/10*** (2013.01)

(58) **Field of Classification Search**
CPC G06F 17/30648
USPC 707/749
See application file for complete search history.

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Primary Examiner — Noosha Arjomandi
(74) *Attorney, Agent, or Firm* — Oliff PLC

(57) **ABSTRACT**

Relevance analysis devices, methods, and programs analyze a mutual relevance between a plurality of users utilizing a server that allows users to view information provided by target viewed users. The devices, methods, and programs specify an analysis reference user and an analysis target user. The devices, methods, and programs specify a route that spans between the analysis reference user and the target viewed user, and specify a mutual relevance between the analysis reference user and the analysis target user based on a number of component routes that make up the specified route and based on a number of the component routes in which an origin-side user is registered as a target viewed user by an end-side user.

20 Claims, 9 Drawing Sheets

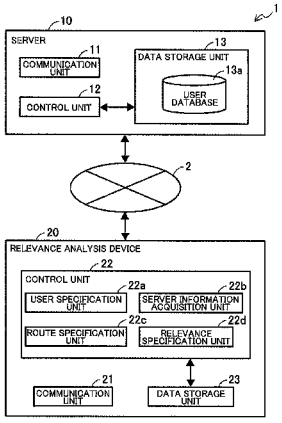

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FIG. 1

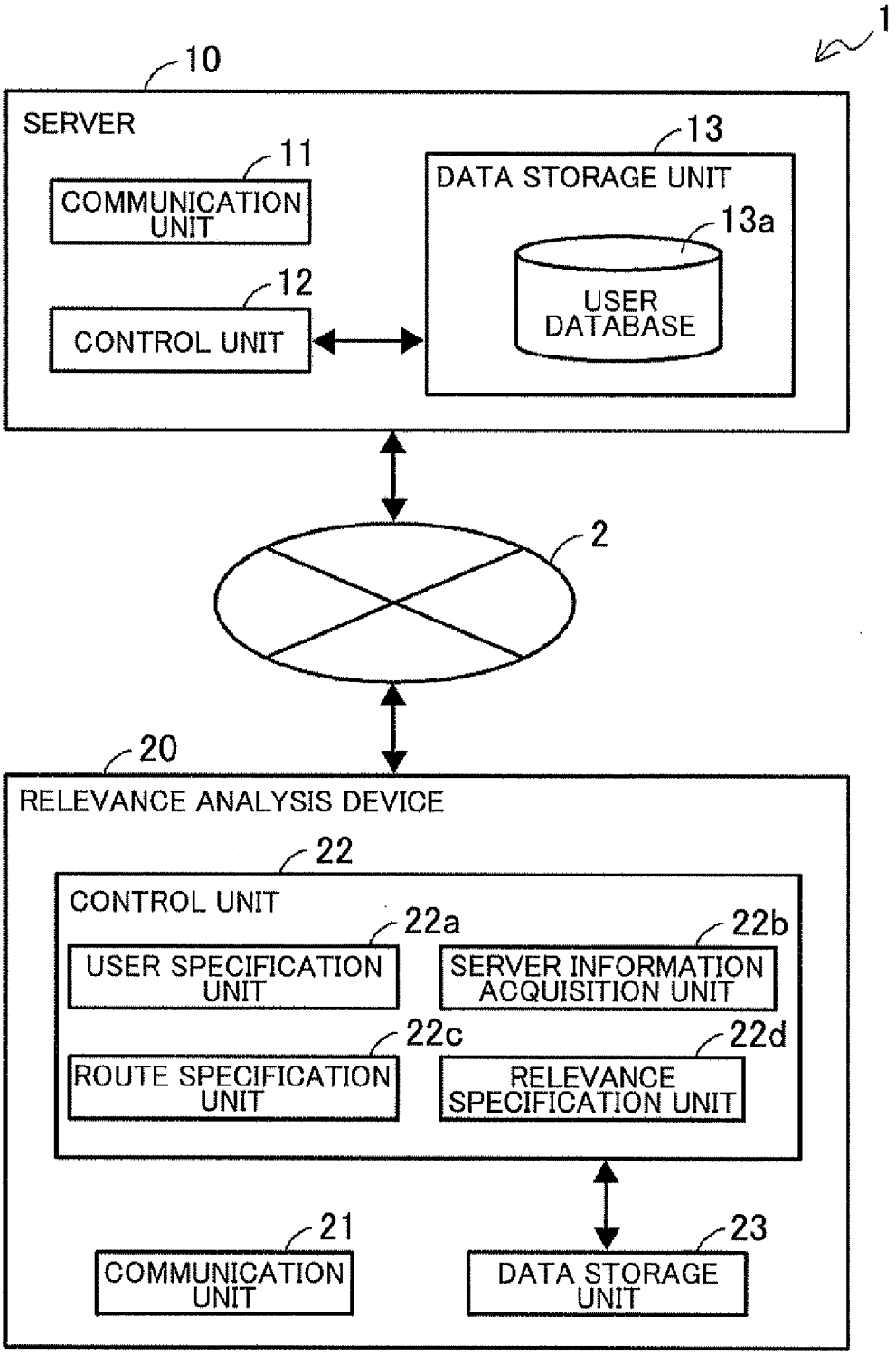
1
10
SERVER
11
COMMUNICATION UNIT
12
CONTROL UNIT
13
DATA STORAGE UNIT
13a
USER DATABASE
2
20
RELEVANCE ANALYSIS DEVICE
22
CONTROL UNIT
22a
USER SPECIFICATION UNIT
22b
SERVER INFORMATION ACQUISITION UNIT
22c
ROUTE SPECIFICATION UNIT
22d
RELEVANCE SPECIFICATION UNIT
21
COMMUNICATION UNIT
23
DATA STORAGE UNIT

FIG. 2

[USER DATABASE]

USER ID	VIEWING TARGET USER ID
A	B,E,P,···
B	A,C,Q,···
⋮	⋮

FIG. 3

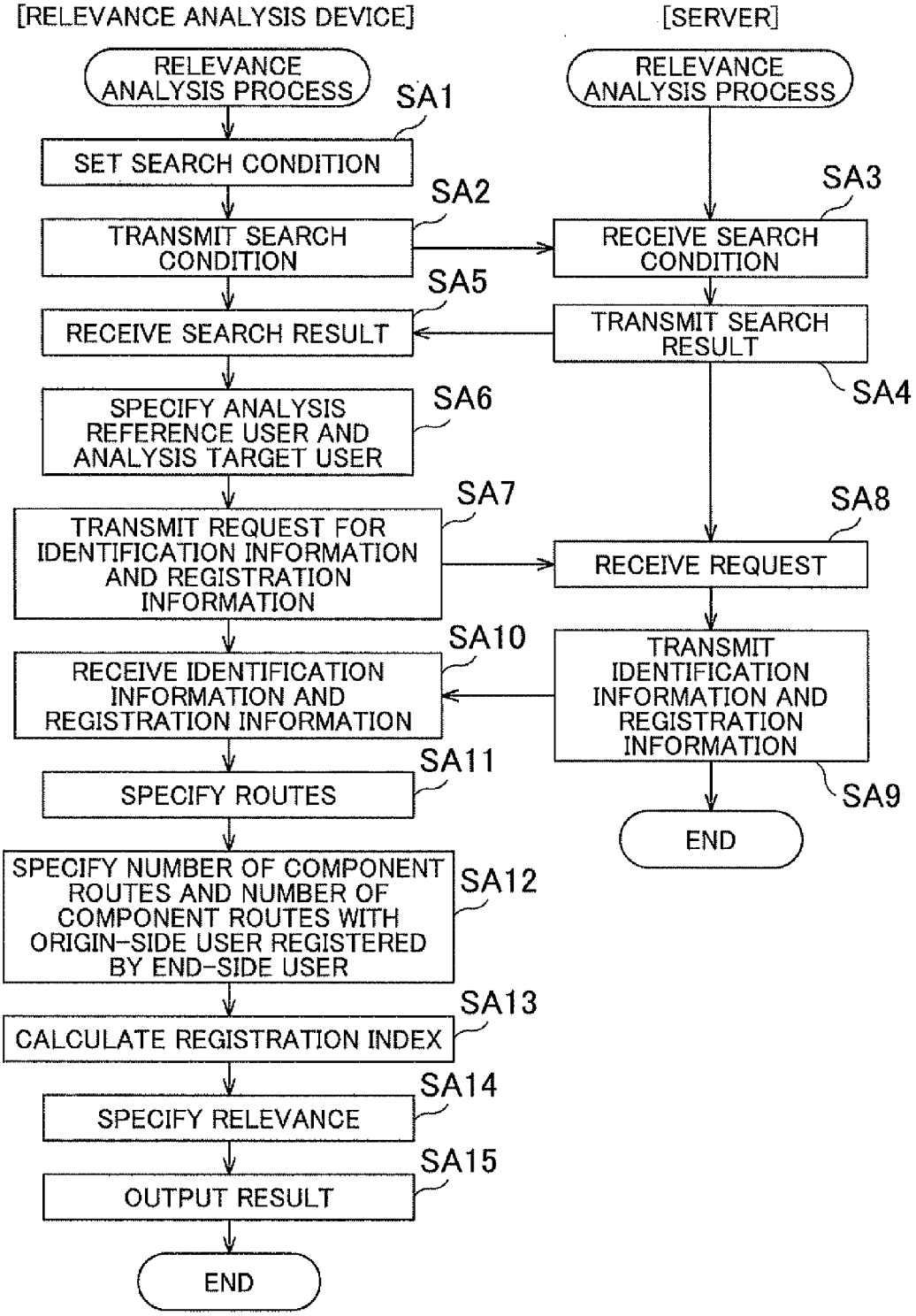
[RELEVANCE ANALYSIS DEVICE]
[SERVER]
RELEVANCE ANALYSIS PROCESS
RELEVANCE ANALYSIS PROCESS
SA1
SET SEARCH CONDITION
SA2
TRANSMIT SEARCH CONDITION
SA3
RECEIVE SEARCH CONDITION
SA5
RECEIVE SEARCH RESULT
TRANSMIT SEARCH RESULT
SA4
SA6
SPECIFY ANALYSIS REFERENCE USER AND ANALYSIS TARGET USER
SA7
TRANSMIT REQUEST FOR IDENTIFICATION INFORMATION AND REGISTRATION INFORMATION
SA8
RECEIVE REQUEST
SA10
RECEIVE IDENTIFICATION INFORMATION AND REGISTRATION INFORMATION
TRANSMIT IDENTIFICATION INFORMATION AND REGISTRATION INFORMATION
SA9
SA11
SPECIFY ROUTES
END
SPECIFY NUMBER OF COMPONENT ROUTES AND NUMBER OF COMPONENT ROUTES WITH ORIGIN-SIDE USER REGISTERED BY END-SIDE USER
SA12
SA13
CALCULATE REGISTRATION INDEX
SA14
SPECIFY RELEVANCE
SA15
OUTPUT RESULT
END

FIG. 4

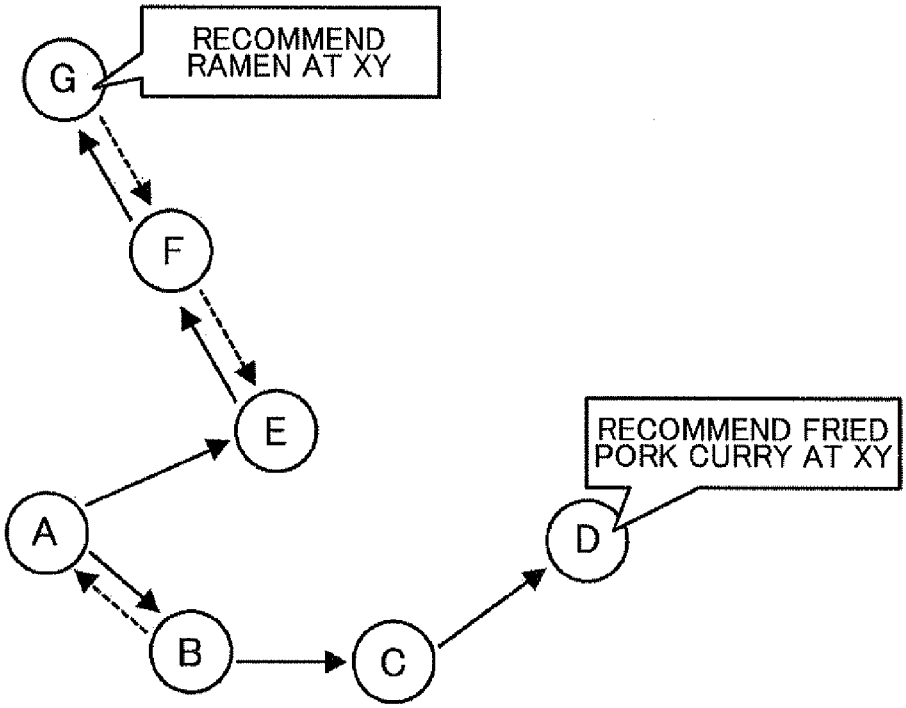

FIG. 5

[RELEVANCE TABLE]

ORIGIN/END	NUMBER OF COMPONENT ROUTES	REGISTRATION INDEX	RELEVANCE
AD	3	5	8
AG	3	4	7

FIG. 6

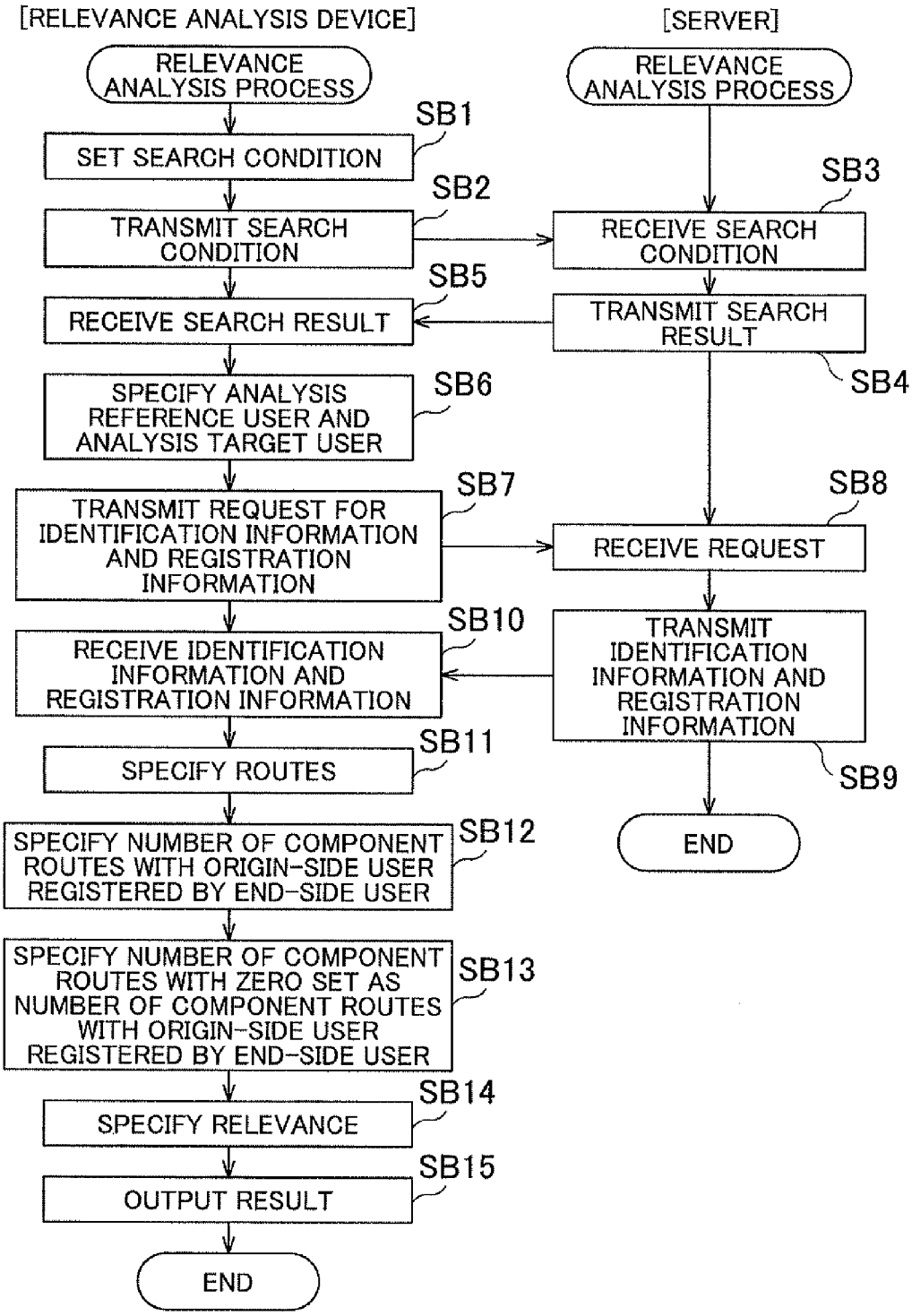
[RELEVANCE ANALYSIS DEVICE]
[SERVER]
RELEVANCE ANALYSIS PROCESS
RELEVANCE ANALYSIS PROCESS
SB1
SET SEARCH CONDITION
SB2
TRANSMIT SEARCH CONDITION
SB3
RECEIVE SEARCH CONDITION
SB5
RECEIVE SEARCH RESULT
TRANSMIT SEARCH RESULT
SB4
SB6
SPECIFY ANALYSIS REFERENCE USER AND ANALYSIS TARGET USER
SB7
TRANSMIT REQUEST FOR IDENTIFICATION INFORMATION AND REGISTRATION INFORMATION
SB8
RECEIVE REQUEST
SB10
RECEIVE IDENTIFICATION INFORMATION AND REGISTRATION INFORMATION
TRANSMIT IDENTIFICATION INFORMATION AND REGISTRATION INFORMATION
SB9
SB11
SPECIFY ROUTES
END
SB12
SPECIFY NUMBER OF COMPONENT ROUTES WITH ORIGIN-SIDE USER REGISTERED BY END-SIDE USER
SB13
SPECIFY NUMBER OF COMPONENT ROUTES WITH ZERO SET AS NUMBER OF COMPONENT ROUTES WITH ORIGIN-SIDE USER REGISTERED BY END-SIDE USER
SB14
SPECIFY RELEVANCE
SB15
OUTPUT RESULT
END

FIG. 7A

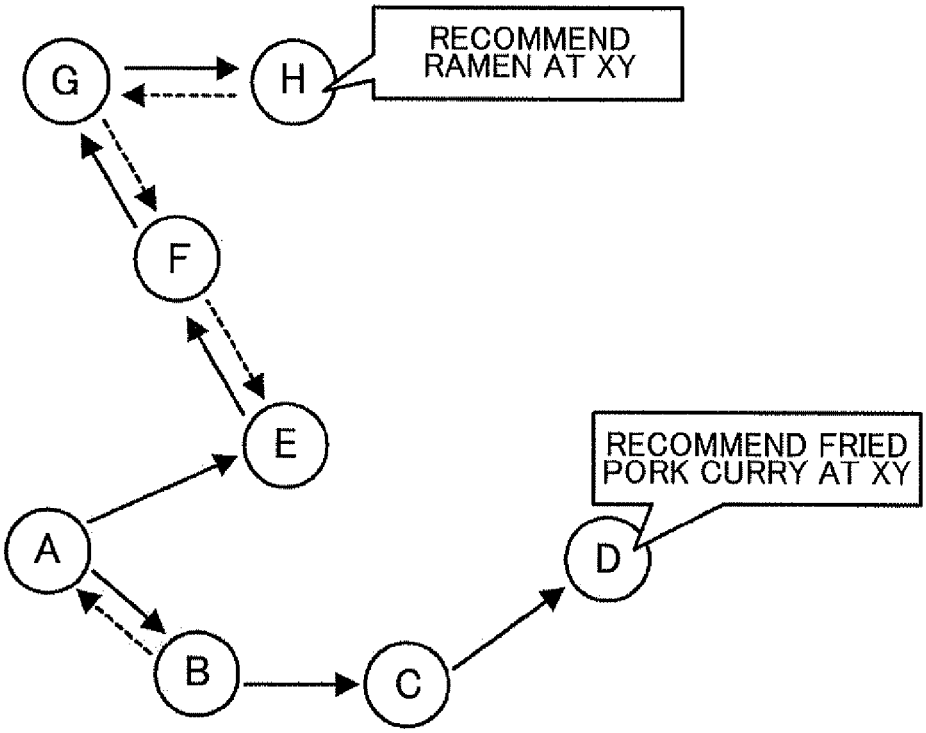
RECOMMEND RAMEN AT XY
G
H
F
E
RECOMMEND FRIED PORK CURRY AT XY
A
D
B
C

FIG. 7B

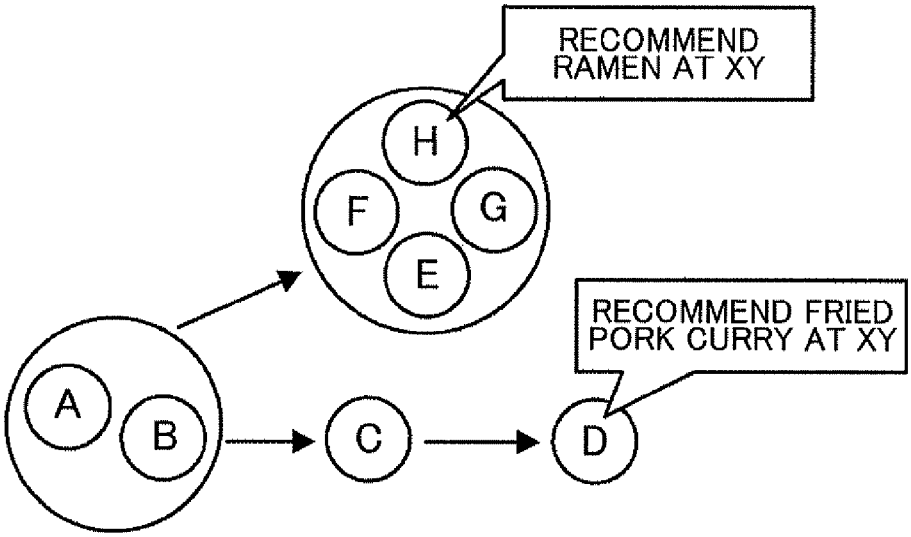
RECOMMEND RAMEN AT XY
H
F
G
E
RECOMMEND FRIED PORK CURRY AT XY
A
B
C
D

FIG. 8

[RELEVANCE TABLE]

ORIGIN/END	NUMBER OF ORIGINAL COMPONENT ROUTES	NUMBER OF COMPONENT ROUTES AFTER RECONFIGURING ROUTE
AD	3	2
AH	4	1

FIG. 9

[USER DATABASE]

USER ID	VIEWING TARGET USER ID	PROVISION QUANTITY INFORMATION	
		ADDRESSEE	PROVISION QUANTITY
A	B,E,P,…	B	20
		P	15
		⋮	⋮
B	A,C,Q,…	A	20
		⋮	⋮
⋮	⋮	⋮	⋮

FIG. 10

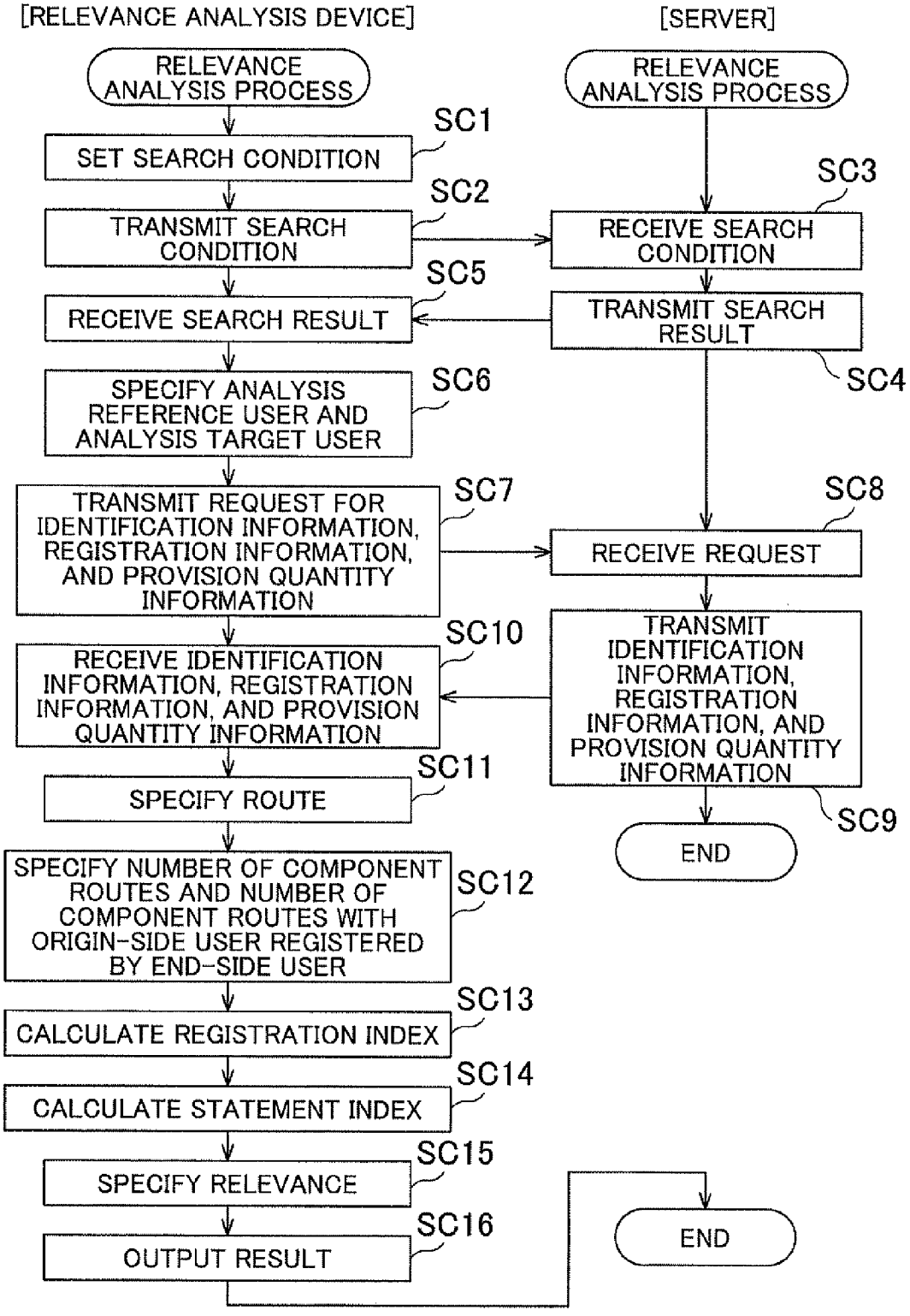
[RELEVANCE ANALYSIS DEVICE]
[SERVER]
RELEVANCE ANALYSIS PROCESS
RELEVANCE ANALYSIS PROCESS
SC1
SET SEARCH CONDITION
SC2
TRANSMIT SEARCH CONDITION
SC3
RECEIVE SEARCH CONDITION
SC5
RECEIVE SEARCH RESULT
TRANSMIT SEARCH RESULT
SC4
SC6
SPECIFY ANALYSIS REFERENCE USER AND ANALYSIS TARGET USER
SC7
TRANSMIT REQUEST FOR IDENTIFICATION INFORMATION, REGISTRATION INFORMATION, AND PROVISION QUANTITY INFORMATION
SC8
RECEIVE REQUEST
SC10
RECEIVE IDENTIFICATION INFORMATION, REGISTRATION INFORMATION, AND PROVISION QUANTITY INFORMATION
TRANSMIT IDENTIFICATION INFORMATION, REGISTRATION INFORMATION, AND PROVISION QUANTITY INFORMATION
SC9
SC11
SPECIFY ROUTE
END
SPECIFY NUMBER OF COMPONENT ROUTES AND NUMBER OF COMPONENT ROUTES WITH ORIGIN-SIDE USER REGISTERED BY END-SIDE USER
SC12
SC13
CALCULATE REGISTRATION INDEX
SC14
CALCULATE STATEMENT INDEX
SC15
SPECIFY RELEVANCE
SC16
OUTPUT RESULT
END

FIG. 11

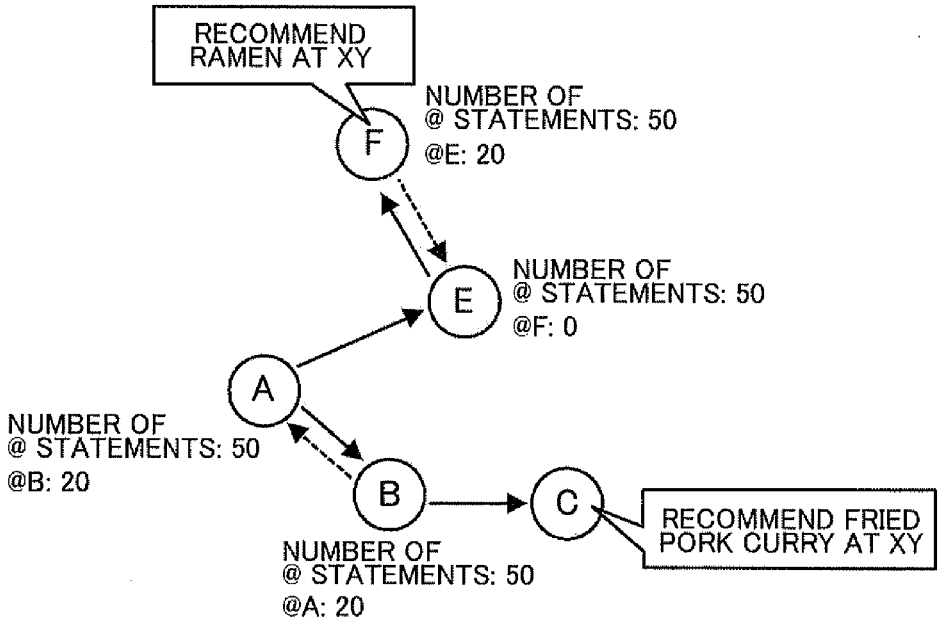

FIG. 12

[RELEVANCE TABLE]

ORIGIN/END	NUMBER OF COMPONENT ROUTES	REGISTRATION INDEX	STATEMENT INDEX	RELEVANCE
AC	2	3	0.4	4.6
AF	2	3	0	5

RELEVANCE ANALYSIS DEVICE, RELEVANCE ANALYSIS METHOD, AND RELEVANCE ANALYSIS PROGRAM

INCORPORATION BY REFERENCE

The disclosure of Japanese Patent Application No. 2011-006859, filed on Jan. 17, 2011, including the specification, drawings, and abstract is incorporated herein by reference in its entirety.

BACKGROUND

1. Related Technical Fields

Related technical fields include relevance analysis devices, relevance analysis methods, and relevance analysis programs.

2. Related Art

Services such as Twitter® and various types of social network services (SNSs) are now provided that allow other users to view statements posted to a server by a given user. Numerous users post a large quantity of information through these services, and it is sometimes difficult for viewers of posted information to determine which posts are reliable.

In view of this, a post information evaluation system for evaluating the reliability of posted information has been proposed. In this post information evaluation system, a client terminal for transmitting post information to a server includes a position data acquisition unit for acquiring position data. The position data acquired by the position data acquisition unit is transmitted together with the post information to the server. The server then evaluates the reliability of the post information based on the distance between a position of a facility included in the post information and a position specified by the position data transmitted together with the post information (see Japanese Patent Application Publication No. JP-A-2007-304977, for example).

SUMMARY

However, the system according to the related art as described above simply evaluates the reliability based on the distance between a position of a facility or the like specified based on the post information and a position specified by the position data transmitted together with the post information. This system gives no consideration to the relevance between the user who posted the post information and the user viewing the post information. Thus, the conventional system cannot provide material for determining whether the user who posted the post information is a user highly relevant to the user viewing the post.

Exemplary implementations of the broad inventive principles described herein provide a relevance analysis device, a relevance analysis method, and a relevance analysis program, which can suitably analyze a mutual relevance between a user who provided information to a server and another user viewing the information.

Exemplary implementations provide a relevance analysis devices, methods, and programs in which a relevance specification unit specifies a mutual relevance between an analysis reference user and an analysis target user based on a number of component routes that constitute a route having an origin that corresponds to the analysis reference user and an end that corresponds to the analysis target user, and based on whether on each component route an origin-side user is registered as a target viewed user by an end-side user. Therefore, the mutual relevance between the analysis reference user and the analysis target user can be suitably analyzed in consideration of a distance between the analysis reference user and the analysis target user in a network and the relevance of the users of the component routes that constitute the route to each other. It is thus possible to provide material for determining whether the user who provided information to the server is a user highly relevant to the user viewing the information.

According to exemplary implementations, the relevance specification unit specifies a higher mutual relevance between the analysis reference user and the analysis target user as the number of the component routes that constitute the route decreases and a number of the component routes, out of the component routes that constitute the route, with the origin-side user registered as the target viewed user by the end-side user increases. Therefore, if the users on component routes that constitute a particular route have registered each other, the high mutual relevance of such users can be incorporated into determining the mutual relevance between the analysis reference user and the analysis target user. Accordingly, relevance can be even more suitably analyzed.

According to exemplary implementations, when specifying the number of the component routes that constitute the route, the relevance specification unit specifies zero as the number of the component routes that constitute the route with the origin-side user registered as the target viewed user by the end-side user. Therefore, if the users on component routes that constitute a particular route have registered each other, the high mutual relevance of such users can be incorporated into determining the mutual relevance between the analysis reference user and the analysis target user. Accordingly, relevance can be even more suitably analyzed.

According to exemplary implementations, the relevance specification unit specifies a quantity of information provided by the origin-side user addressed to the end-side user for each of the component routes that constitute the route, and specifies the mutual relevance between the analysis reference user and the analysis target user based on the specified quantity. Therefore, if information is provided by the origin-side user addressed to the end-side user on any of the component routes that constitute the route, the high mutual relevance of such users can be incorporated into determining the mutual relevance between the analysis reference user and the analysis target user. Accordingly, relevance can be even more suitably analyzed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram that illustrates a relevance analysis system according to a first example;

FIG. **2** is a table that illustrates information stored in a user database;

FIG. **3** is a flowchart of a relevance analysis process algorithm;

FIG. **4** is a conceptual diagram that illustrates routes specified by a route specification unit;

FIG. **5** is a table that shows the relationship between a number of component routes, a registration index, and a relevance of each route illustrated in FIG. **4**;

FIG. **6** is a flowchart of the relevance analysis process algorithm according to a second example;

FIGS. **7**A and **7**B are conceptual diagrams that illustrate routes, wherein FIG. **7**A is a conceptual diagram that illustrates routes specified by the route specification unit, and FIG. **7**B is a conceptual diagram that illustrates a result of reconfiguring the routes of FIG. **7**A with zero set as the number of route-constituting component routes with an origin-side user registered as a target viewed user by an end-side user;

FIG. **8** is a table that shows the number of component routes of the routes illustrated in FIG. **7**A and the number of component routes of the reconfigured routes illustrated in FIG. **7**B;

FIG. **9** is a table that illustrates information stored in the user database according to a third example;

FIG. **10** is a flowchart of the relevance analysis process algorithm according to the third example;

FIG. **11** is a conceptual diagram that illustrates routes specified by the route specification unit; and

FIG. **12** is a table that shows the relationship between the number of component routes, the registration index, and a statement index of each route illustrated in FIG. **11**.

DETAILED DESCRIPTION OF EXEMPLARY IMPLEMENTATIONS

Hereinafter, examples of a relevance analysis device, a relevance analysis method, and a relevance analysis program will be described in detail with reference to the drawings.

I. FIRST EXAMPLE

A first example will be explained here. This example specifies a mutual relevance between an analysis reference user and an analysis target user, based on a number of component routes that constitute a route having an origin that corresponds to the analysis reference user and an end that corresponds to the analysis target user, and based on whether on each component route a user more toward the origin (an origin-side user) is registered as a target viewed user by a user more toward the end (an end-side user).

A. Constitution

First, the constitution of the relevance analysis system according to the first example will be described. FIG. **1** is a block diagram that illustrates the relevance analysis system according to the first example. As shown in FIG. **1**, the relevance analysis system **1** includes a server **10** and a relevance analysis device **20**. The server **10** and the relevance analysis device **20** are communicably connected to each other through a network **2**.

1. Server

The server **10** allows information provided by a user (referred to as "provided information" below as necessary) to be viewed by another user. If a user registers another user as a target viewed user, the server **10** allows the user to view information provided by the target viewed user thus registered. The specific content of the server **10** may take on any form, for example, the Twitter server, an SNS server or a server that hosts various blog sites may be used. The server **10** includes a communication unit **11**, a controller (e.g., control unit **12**), and a data storage unit **13**.

a. Communication Unit

The communication unit **11** communicates through the network **2** with the relevance analysis device **20**. A known communication device may be used as the communication unit **11**.

b. Control Unit

The control unit **12** controls the server **10**. Specifically, the control unit **12** is a computer configured to include a CPU, various programs that are interpreted and executed in the CPU (including an OS and other basic control programs, and application programs that are activated in the OS to carry out specific functions), and an internal memory such as a RAM for storing the programs and various data (likewise with respect to a control unit **22** of the relevance analysis device **20** that will be described later).

c. Data Storage Unit

The data storage unit **13** is a storage unit that stores programs and various data required for operation of the server **10**, and has a configuration that uses a magnetic storage medium such as a hard disk (not shown) as an external memory device, for example. However, any other storage medium, including a semiconductor type storage medium such as a flash memory or an optical storage medium such as a DVD or Blu-ray disc, may be used in place of or in combination with the hard disk (likewise with respect to a data storage unit **23** of the relevance analysis device **20** that will be described later).

The data storage unit **13** includes a user database **13***a*. (Note that "database" will be abbreviated to "DB" below.) FIG. **2** is a table that illustrates information stored in the user DB **13***a*. As shown in FIG. **2**, information that corresponds to the table items of User ID and Target Viewed User ID are mutually associated and stored in the user DB **13***a*. Information stored as corresponding to the User ID item is identification information that uniquely identifies a user (e.g., "A" in FIG. **2**). Information stored as corresponding to the Target Viewed User item is registration information for specifying a target viewed user registered by the user (e.g., "B, E, P, . . . " in FIG. **2**).

Note that a terminal (not shown) is connected through the network **2** to the server **10**, and the user can provide information through the terminal to the server **10**. If the provided information and the identification information corresponding to the user who provided the provided information are provided through the network **2** to the server **10** from the terminal, the control unit **12** of the server **10** refers to the user DB **13***a* and stores the provided information in the data storage unit **13** such that the provided information can be viewed by another user who has registered the user who provided the provided information as a target viewed user.

2. Relevance Analysis Device

Returning to FIG. **1**, the relevance analysis device **20** is used for analyzing a mutual relevance between a plurality of users utilizing the server **10**. The relevance analysis device **20** includes a communication unit **21**, a controller (e.g., the control unit **22**), and the data storage unit **23**.

a. Communication Unit

The communication unit **21** communicates through the network **2** with the server **10**. A known communication device may be used as the communication unit **21**.

b. Control Unit

The control unit **22** includes a user specification unit **22***a*, a server information acquisition unit **22***b*, a route specification unit **22***c*, and a relevance specification unit **22***d* in terms of functional concept. The user specification unit **22***a* specifies, from among the plurality of users, an analysis reference user who serves as a reference for analysis, and an analysis target user who serves as a target for analysis of relevance to the analysis reference user. The server information acquisition unit **22***b* acquires, from the server **10**, the identification information that uniquely identifies the user, and the registration information for specifying the target viewed user registered by the user. The route specification unit **22***c* specifies routes based on the identification information and the registration information acquired by the server information acquisition unit **22***b*. Each route is constituted from one or a plurality of continuous component routes that span between the user and a target viewed user registered by the user. In addition, the route has an origin that is the analysis reference user specified by the user specification unit **22***a*, and an end that is the analysis target user specified by the user specification unit **22***a*. Further, each component route of the route has a relationship in which the end-side user is registered as a target

viewed user by the origin-side user. The relevance specification unit **22***d* specifies a mutual relevance between the analysis reference user and the analysis target user. The processes executed by the various portions of the control unit **22** will be described in detail later. Note that the relevance analysis program according to the first example is installed in the relevance analysis device **20** through any storage medium or network, and configures various portions of the control unit **22** in substance.

c. Data Storage Unit

The data storage unit **23** is a storage unit that stores programs and various data required for operation of the relevance analysis device **20**.

B. Processing

Next, a relevance analysis method will be described with respect to the relevance analysis process algorithm shown in FIG. **3**. The process algorithm may be implemented in the form of a computer program that is stored in, for example, on or more RAMs and/or ROMs included in the relevance analysis system **1**, and executed by either or both of control units **12** and **22**. Although the structure of the above-described relevance analysis system **1** is referenced in the description of the process, the reference to such structure is exemplary, and the process need not be limited by the specific structure of the relevance analysis system **1**.

The relevance analysis process is started up, for example, after the relevance analysis device **20** is powered on and there is an input through an input mechanism (not shown) instructing execution of the relevance analysis process.

As shown in FIG. **3**, once the relevance analysis process is initiated, the user specification unit **22***a* sets a search condition for finding in the server **10** prescribed provided information that is provided to the server **10** by a user (SA**1**). For example, the user specification unit **22***a* outputs information that prompts the input of a search condition from an output mechanism (not shown), and sets a condition input through the input mechanism (not shown) as the search condition. Here, as the set search condition, a keyword (e.g., a facility name or a point name) for finding the provided information that includes information the user wants to know may be used.

Next, the user specification unit **22***a* transmits the search condition set at SA**1** through the network **2** to the server **10** from the communication unit **21** (SA**2**). After the control unit **12** of the server **10** receives the search condition transmitted from the relevance analysis device **20** through the communication unit **11** (SA**3**), the control unit **12** finds the provided information that matches the search condition in the data storage unit **13**, and transmits the found provided information together with the identification information of the user who provided the provided information through the network **2** to the relevance analysis device **20** from the communication unit **11** (SA**4**).

For example, at SA**2**, a restaurant name "XY" may be transmitted as the search condition to the server **10** from the relevance analysis device **20**. Here, the following are found as the provided information that includes "XY": the provided information of "Recommend fried pork curry at XY" that is provided by a user identified by the identification information "D" and the provided information of "Recommend ramen at XY" that is provided by a user identified by the identification information "G" is found. In such case, at SA**4**, the control unit **12** of the server **10** transmits a list that associates such provided information and the identification information of the users that provided the provided information to the relevance analysis device **20**.

The user specification unit **22***a* receives, through the communication unit **21**, the provided information and the identification information that corresponds to such provided information transmitted from the server **10** (SA**5**). The user specification unit **22***a* then specifies the analysis reference user who serves as the reference for analysis, and also specifies, out of the users specified based on the identification information received at SA**5**, the analysis target user who serves as the target for analysis of relevance to the analysis reference user (SA**6**). For example, the user specification unit **22***a* outputs information that prompts the input of identification information that corresponds to the analysis reference user from the output mechanism (not shown). The user specification unit **22***a* then specifies the user who corresponds to the identification information input through the input mechanism (not shown) as the analysis reference user. Alternatively, the user specification unit **22***a* outputs information that prompts the selection of the analysis target user out of the users that correspond to the identification information received at SA**5** and the input of the identification information of the user from the output mechanism (not shown). The user specification unit **22***a* then specifies the user who corresponds to the identification information input through the input mechanism (not shown) as the analysis target user.

Next, the server information acquisition unit **22***b* requests that the server **10** transmit the identification information and the registration information stored in the user DB **13***a* of the server **10** (SA**7**). After the control unit **12** of the server **10** receives through the communication unit **11** the request for transmission of the identification information and the registration information (SA**8**), the control unit **12** transmits the identification information and the registration information stored in the user DB **13***a* through the network **2** to the relevance analysis device **20** from the communication unit **11** (SA**9**). Note that the control unit **12** of the server **10** may transmit all the identification information and registration information stored in the user DB **13***a* through the communication unit **11** to the relevance analysis device **20**. Alternatively, the control unit **12** may transmit only the identification information and registration information that match a prescribed condition (e.g., if area setting information that specifies an area set for every user is stored associated with the identification information, the identification information and the registration information of the users who have the same area setting as the analysis reference user or the analysis target user) among the identification information and the registration information stored in the user DB **13***a* through the communication unit **11** to the relevance analysis device **20**. Following the processing at SA**9**, the control unit **12** of the server **10** ends the relevance analysis process.

The server information acquisition unit **22***b* receives, through the communication unit **21**, the identification information and the registration information transmitted from the server **10** (SA**10**). The route specification unit **22***c* specifies routes based on the identification information and the registration information acquired by the server information acquisition unit **22***b* (SA**11**). Each route is constituted from one or a plurality of continuous component routes that span between the user and a target viewed user registered by the user. In addition, the route has an origin that is the analysis reference user and an end that is the analysis target user. Further, each component route of the route has a relationship in which the end-side user is registered as a target viewed user by the origin-side user. The route specification unit **22***c* specifies the shortest route having an origin that is the analysis reference user and an end that is the analysis target user using a known route search method such as Dijkstra's algorithm, for example.

FIG. **4** is a conceptual diagram that illustrates routes specified by the route specification unit **22***c*. In FIG. **4**, the alphabet letters in circles represent the identification information. In the example of FIG. **4**, A is the analysis reference user (i.e., route origin), and D and G are the analysis target users (i.e., route ends) that provided the provided information that includes the keyword "XY." The arrows between each alphabet letter represent component routes from each user to a target viewed user registered by that particular user. The solid arrows indicate component routes that constitute a route having an origin that is the analysis reference user and an end that is the analysis target user (i.e., component routes with the end-side user registered as a target viewed user by the origin-side user). The dashed arrows indicate the component routes, among the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user. According to FIG. **4**, the route specification unit **22***c* has specified two routes: a route that starts at an origin A and ends at an end D, with component routes connecting at B, C, and D in that order; and a route that starts at the origin A and ends at an end G, with component routes connecting at E, F, and G in that order.

Returning to FIG. **3**, the relevance specification unit **22***d* specifies the number of component routes that constitute the routes specified by the route specification unit **22***c*, and also specifies, based on the identification information and the registration information, the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user (SA**12**). In the example of FIG. **4**, the relevance specification unit **22***d* specifies "3" as the number of component routes that constitute the route from the origin A to the end D (solid arrows in FIG. **4**), and specifies "1" as the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user (dashed arrows in FIG. **4**). In addition, the relevance specification unit **22***d* specifies "**3**" as the number of component routes that constitute the route from the origin A to the end G, and specifies "2" as the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user.

Returning to FIG. **3**, the relevance specification unit **22***d* calculates a registration index of each route, based on the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user, as specified by the relevance specification unit **22***d* at SA**12** (SA**13**). The "registration index" is an index used by the relevance specification unit **22***d* to specify the mutual relevance between the analysis reference user and the analysis target user, and is calculated according to the following equation (1):

$$\text{registration index} = \begin{pmatrix} \text{number of component routes,} \\ \text{out of route-constituitng component} \\ \text{routes, with origin-side user registered} \\ \text{as target viewed user by end-side user} \end{pmatrix} + \quad (1)$$

-continued

$$\left[\begin{pmatrix} \text{number of} \\ \text{route-constiuitng component} \\ \text{routes} \end{pmatrix} - \begin{pmatrix} \text{number of component routes,} \\ \text{out of route-constituitng component} \\ \text{routes, with origin-side user registered} \\ \text{as target viewed user by end-side user} \end{pmatrix} \right] \times 2$$

According to this equation, the registration index becomes smaller as the number of route-constituting component routes decreases and the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user increases. In the example of FIG. **4**, for the route from the origin A to the end D, 3 is the number of route-constituting component routes and 1 is the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user. Therefore, the registration index is calculated as $1+(3-1)\times 2=5$. In addition, for the route from the origin A to the end G, 3 is the number of route-constituting component routes and 2 is the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user. Therefore, the registration index is calculated as $2+(3-2)\times 2=4$.

Returning to FIG. **3**, the relevance specification unit **22***d* specifies the mutual relevance between the analysis reference user and the analysis target user based on the number of component routes that constitute each route as specified by the relevance specification unit **22***d* at SA**12** and the registration index of each route as specified by the relevance specification unit **22***d* at SA**13** (SA**14**). More specifically, the relevance specification unit **22***d* calculates, as a numerical value indicative of relevance, the sum of the number of component routes constituting each route and the registration index of each particular route. As explained above, the registration index becomes smaller as the number of route-constituting component routes decreases and the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user increases. Therefore, the numerical value indicative of relevance also becomes smaller as the number of route-constituting component routes decreases and the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user increases. Here, a small number of route-constituting component routes can be taken to mean that the distance on the network between the analysis reference user and the analysis target user is small, and also that the relevance between the analysis reference user and the analysis target user is high. Further, a large number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user can be taken to mean that there are many combinations of users who have mutually registered each other as target viewed users among the route-constituting component routes, and also that the route is constituted by users with high mutual relevance. Therefore, the relevance between the analysis reference user and the analysis target user can be considered high. Thus, a smaller numerical value indicative of relevance shows a higher relevance between the analysis reference user and the analysis target user.

In the example of FIG. **4**, for the route from the origin A to the end D, 3 is the number of route-constituting component routes and 5 is the registration index. Therefore, the relevance is calculated as 3+5=8. In addition, for the route from the origin A to the end G, 3 is the number of route-constituting component routes and 4 is the registration index. Therefore, the relevance is calculated as 3+4=7. FIG. **5** is a table that shows the relationship between the number of component routes, the registration index, and the relevance of each route illustrated in FIG. **4**. As shown in FIG. **5**, the route from the origin A to the end D and the route from the origin A to the end G have an equal number of component routes, that is, 3 component routes. However, compared to the registration index of 5 for the route from the origin A to the end D, the route from the origin A to the end G has a smaller registration index of 4. Thus, the numerical value indicative of the relevance between the analysis reference user and the analysis target user is smaller for the route from the origin A to the end G with a relevance of 7 compared to the route from the origin A to the end D with a relevance of 8. Based on this, the mutual relevance between the analysis reference user A and the analysis target user G is specified as higher than the mutual relevance between the analysis reference user A and the analysis target user D.

Returning to FIG. **3**, the relevance specification unit **22***d* outputs the specification result of the mutual relevance between the analysis reference user and the analysis target user (SA**15**). Note that the output of the relevance specification result may take on any form. For example, the numerical value indicative of relevance calculated at SA**14** may be output for every route through the output mechanism (not shown) that may be a display. Alternatively, the provided information and the identification information transmitted from the server **10** to the relevance analysis device **20** at SA**4** which correspond to the analysis target user may be arranged in order starting with the highest mutual relevance between the analysis reference user and the analysis target user (i.e., in order starting with the smallest numerical value indicative of relevance), and output through the output mechanism. Following the processing at SA**15**, the control unit **22** of the relevance analysis device **20** ends the relevance analysis process.

C. Effects

According to the first example described above, the relevance specification unit **22***d* specifies the mutual relevance between the analysis reference user and the analysis target user based on the number of component routes that constitute a route having an origin that is the analysis reference user and an end that is the analysis target user, and based on whether the origin-side user is registered as a target viewed user by the end-side user of each component route. Therefore, the mutual relevance between the analysis reference user and the analysis target user can be suitably analyzed in consideration of the distance between the analysis reference user and the analysis target user in the network and the relevance of the users of the route-constituting component routes to each other. It is thus possible to provide material for determining whether the user who provided the provided information to the server **10** is a user highly relevant to the user viewing the information.

In particular, the relevance specification unit **22***d* specifies a higher mutual relevance between the analysis reference user and the analysis target user as the number of route-constituting component routes decreases and the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user increases. Therefore, if the users on the route-constituting component routes have registered each other, the high mutual relevance of such users can be incorporated into determining the mutual relevance between the analysis reference user and the analysis target user. Accordingly, relevance can be even more suitably analyzed.

II. SECOND EXAMPLE

Next, a second example will be described. In this example, the number of component routes, out of the route-constituting component routes, with the origin-side user registered as a target viewed user by the end-side user is set to zero. The configuration of the second example is generally identical to the configuration of the first example unless otherwise noted. For configurations generally identical to those of the first example, the same reference symbols and/or names as used in the first example are assigned as necessary and accompanying explanations are omitted.

A. Processing

The relevance analysis process executed by the relevance analysis system **1** according to the second example will be described. FIG. **6** is a flowchart of the relevance analysis process according to the second example. Note that, among the relevance analysis process according to the second example, SB**1** to SB**11** and SB**15** are identical to SA**1** to SA**11** and SA**15** in FIG. **3**, respectively, and will not be further explained here.

Following the processing at SB**11**, based on the identification information and the registration information received at SB**10**, the relevance specification unit **22***d* specifies the component routes, out of the component routes that constitute the routes specified by the route specification unit **22***c*, with the origin-side user registered as a target viewed user by the end-side user (SB**12**).

FIG. **7**A is a conceptual diagram that illustrates routes specified by the route specification unit **22***c*. In the example of FIG. **7**A, A is the analysis reference user (i.e., route origin), and D and H are the analysis target users (i.e., route ends) that provided the provided information that includes the keyword "XY." According to FIG. **7**A, the route specification unit **22** has specified two routes: a route that starts at an origin A and ends at an end D, with component routes connecting at B, C, and D in that order; and a route that starts at the origin A and ends at an end H, with component routes connecting at E, F, G, and H in that order.

Returning to FIG. **6**, the relevance specification unit **22***d* specifies the number of the component routes that constitute the routes specified by the route specification unit **22***c*, with zero set as the number of component routes with the origin-side user registered as a target viewed user by the end-side user (SB**13**).

FIG. **7**B is a conceptual diagram that illustrates a result of reconfiguring the routes of FIG. **7**A with zero set as the number of route-constituting component routes with the origin-side user registered as a target viewed user by the end-side user. According to FIG. **7**A, among the various component routes that constitute the route from the origin A to the end D, the origin-side user is registered as a target viewed user by the end-side user on the component route between A and B. In such case, the relevance specification unit **22***d* sets zero as the number of component routes between A and B. That is, as shown in FIG. **7**B, A and B constitute a group in which the distance between A and B on the network is zero. Thus, the relevance specification unit **22***d* specifies "2" as the number of component routes that constitute the route from the origin A to the end D. In addition, according to FIG. **7**A, among the various component routes that constitute the route from the origin A to the end H, the origin-side user is registered as a

target viewed user by the end-side user on the component routes between E and F, F and G, and G and H. In such case, the relevance specification unit **22***d* sets zero as the number of component routes between E and F, F and G, and G and H. That is, as shown in FIGS. **7**B, E, F, G, and H constitute a group in which the distance between each on the network is zero. Thus, the relevance specification unit **22***d* specifies "1" as the number of component routes that constitute the route from the origin A to the end H.

Returning to FIG. **6**, the relevance specification unit **22***d* specifies the number of component routes specified by the relevance specification unit **22***d* at SB**13** as a numerical value indicative of the mutual relevance between the analysis reference user and the analysis target user (SB**14**). FIG. **8** is a table that shows the number of component routes (original number of component routes) of the route illustrated in FIG. **7**A and the number of component routes of the reconfigured routes illustrated in FIG. **7**B. As shown in FIG. **8**, 3 is the number of original component routes of the route from the origin A to the end D, while 4 is the number of original component routes of the route from the origin A to the end H. Therefore, the route from the origin A to the end H has a larger number of component routes. However, if the route is reconfigured with zero set as the number of route-constituting component routes with the origin-side user registered as a target viewed user by the end-side user, 2 is the number of component routes of the route from the origin A to the end D, while 1 is the number of component routes of the route from the origin A to the end H. Therefore, the route from the origin A to the end H has a smaller number of component routes. Based on this, the relevance between the analysis reference user A and the analysis target user H is specified as higher than the relevance between the analysis reference user A and the analysis target user D.

B. Effects

According to the second example as described above, when specifying the number of route-constituting component routes, the relevance specification unit **22***d* specifies zero as the number of route-constituting component routes with the origin-side user registered as a target viewed user by the end-side user. Therefore, if the users on the route-constituting component routes have registered each other, the high mutual relevance of such users can be incorporated into determining the mutual relevance between the analysis reference user and the analysis target user. Accordingly, relevance can be even more suitably analyzed.

III. THIRD EXAMPLE

Next, a third example will be described. In this example, the mutual relevance between the analysis reference user and the analysis target user is specified based on a quantity of information the origin-side user provides addressed to the end-side user on each route-constituting component route. The configuration of the third example is generally identical to the configuration of the first example unless otherwise noted. For configurations generally identical to those of the first example, the same reference symbols and/or names as used in the first example are assigned as necessary and accompanying explanations are omitted.

A. Constitution

First, the constitution of the relevance analysis system **1** according to the third example will be described.

1. Server

a. Data Storage Unit

FIG. **9** is a table that illustrates information stored in the user DB **13***a* according to the third example. As shown in FIG. **9**, information that corresponds to the table item of Provision Quantity Information is stored associated with the information that corresponds to the table items of User ID and Target Viewed User ID. The information stored corresponding to the Provision Quantity Information item is provision quantity information that specifies a quantity of information provided by each user to the server **10** as addressed to another user. The identification information of the addressed user (e.g., "B" in FIG. **9**) is stored corresponding to the sub-item of Addressee, and the quantity of information provided to the server **10** addressed to that particular user (e.g., "**20**" in FIG. **9**) is stored corresponding to the sub-item Provision Quantity.

B. Processing

Next, the relevance analysis process executed by the relevance analysis system **1** according to the third example will be described. FIG. **10** is a flowchart of the relevance analysis process according to the third example. Note that, among the relevance analysis process according to the third example, SC**1** to SC**6**, SC**11** to SC**13**, and SC**16** are identical to SA**1** to SA**6**, SA**11** to SA**13**, and SA**15** in FIG. **3**, respectively, and will not be further explained here.

Following the processing at SC**6**, the server information acquisition unit **22***b* requests that the server **10** transmit the identification information, the registration information, and provision quantity information stored in the user DB **13***a* of the server **10** (SC**7**). After the control unit **12** of the server **10** receives through the communication unit **11** the request for transmission of the identification information, the registration information, and the provision quantity information (SC**8**), the control unit **12** transmits the identification information, the registration information, and the provision quantity information stored in the user DB **13***a* through the network **2** to the relevance analysis device **20** from the communication unit **11** (SC**9**). Following the processing at SC**9**, the control unit **12** of the server **10** ends the relevance analysis process.

The server information acquisition unit **22***b* receives, through the communication unit **21**, the identification information, the registration information, and the provision quantity information transmitted from the server **10** (SC**10**).

Following the processing at SC**13**, the relevance specification unit **22***d* calculates a statement index for each route, based on the provision quantity information received by the server information acquisition unit **22***b* from the server **10** at SC**10** (SC**14**). The "statement index" is an index used by the relevance specification unit **22***d* to specify the mutual relevance between the analysis reference user and the analysis target user. For example, the relevance specification unit **22***d* calculates the following equation (2) for each component route, among the component routes that constitute a route, with the origin-side user and the end-side user providing information to the server **10** addressed to each other:

$$\text{value} = \frac{\left(\begin{array}{c}\text{quantity of information provided by origin-side}\\ \text{user to server 10 addressed to end-side user}\end{array}\right)}{\left(\begin{array}{c}\text{quantity of all information provided by origin-side}\\ \text{user to server 10 addressed to other users}\end{array}\right)} \quad (2)$$

The total sum of the calculated values is the statement index. That is, the statement index becomes larger as the proportion of information addressed to the end-side user increases with respect to the information provided by the origin-side user to the server **10** addressed to other users.

FIG. **11** is a conceptual diagram that illustrates routes specified by the route specification unit **22***c*. In the example of FIG. **11**, A is the analysis reference user (i.e., route origin), and C and F are the analysis target users (i.e., route ends) that provided the provided information that includes the keyword "XY." According to FIG. **11**, the route specification unit **22***c* has specified two routes: a route that starts at the origin A and ends at an end C, with component routes connecting at B and C in that order; and a route that starts at the origin A and ends at an end F, with component routes connecting at E and F in that order. Also, in FIG. **11**, "number of @ statements" indicates the quantity of all information provided by the user to the server **10** addressed to other users, and "@alphabet letter" indicates the quantity of information provided by the user to the server **10** addressed to another user corresponding to that alphabet letter. According to the example of FIG. **11**, for the route from the origin A to the end C, the component route between A and B is a component route for which the origin-side user and the end-side user provided information to the server **10** addressed to each other. On this component route, 20 is the quantity of information provided by the origin-side user A to the server **10** addressed to the end-side user B, and 50 is the quantity of all information provided by the origin-side user A to the server **10** addressed to other users. Therefore, the statement index is calculated as 20/50=0.4. Meanwhile, for the route from the origin A to the end F, there is no component route for which the origin-side user and the end-side user provided information to the server **10** addressed to each other. Therefore, the statement index is calculated as zero.

Returning to FIG. **10**, the relevance specification unit **22***d* specifies the mutual relevance between the analysis reference user and the analysis target user based on the number of component routes that constitute each route as specified by the relevance specification unit **22***d* at SC**12**, the registration index of each route as calculated at SC**13**, and the statement index of each route as calculated at SC**14** (SC**15**). More specifically, the relevance specification unit **22***d* calculates, as a numerical value indicative of relevance, a value that subtracts the statement index of a particular route from the sum of the number of component routes constituting the route and the registration index of the route. As described above, the statement index becomes larger as the proportion of information provided by the origin-side user to the server **10** addressed to the end-side user increases with respect to the information provided by the origin-side user to the server **10** addressed to other users. Therefore, the value indicative of relevance becomes smaller as the proportion of information provided by the origin-side user to the server **10** addressed to the end-side user increases.

In the example of FIG. **11**, for the route from the origin A to the end C, 2 is the number of route-constituting component routes, 3 is the registration index, and 0.4 is the statement index. Therefore, the relevance is calculated as 2+3−0.4=4.6. In addition, for the route from the origin A to the end F, 2 is the number of route-constituting component routes, 3 is the registration index, and 0 is the statement index. Therefore, the relevance is calculated as 2+3−0=5. FIG. **12** is a table that shows the relationship between the number of component routes, the registration index, the statement index, and the relevance of each route illustrated in FIG. **11**. As shown in FIG. **12**, for both the route from the origin A to the end C and the route from the origin A to the end F, the sum of the number of component routes and the registration index is the same, that is, 5. However, compared to the statement index of 0.4 for the route from the origin A to the end C, the route from the origin A to the end F has a statement index of zero. Consequently, the numerical value indicative of the relevance between the analysis reference user and the analysis target user is larger for the route from the origin A to the end F with a relevance of 5 compared to the route from the origin A to the end C with a relevance of 4.6. Based on this, the relevance between the analysis reference user A and the analysis target user C is specified as higher than the relevance between the analysis reference user A and the analysis target user F. This reflects the fact that, on the component route between A and B that constitutes the route from the origin A to the end C, the origin-side user A provided information addressed to the end-side user B and therefore the mutual relevance between the users on that particular component route is high.

C. Effects

According to the third example described above, the relevance specification unit **22***d* specifies the quantity of information provided by the origin-side user addressed to the end-side user for each route-constituting component route, and specifies the mutual relevance between the analysis reference user and the analysis target user based on the specified quantity. Therefore, if information is provided by the origin-side user addressed to the end-side user on any route-constituting component route, the high mutual relevance of such users can be incorporated into &twinning the mutual relevance between the analysis reference user and the analysis target user. Accordingly, relevance can be even more suitably analyzed.

IV. MODIFICATIONS

While various features have been described in conjunction with the examples outlined above, various alternatives, modifications, variations, and/or improvements of those features and/or examples may be possible. Accordingly, the examples, as set forth above, are intended to be illustrative.

The problems to be solved and the effects are not limited to the content described above and may vary depending on the environment in which the inventive principles are practiced and the detailed configuration thereof. The above problems may be only partially solved, and the above effects only partially achieved.

Various changes, some examples of which are discussed below, may be made without departing from the broad spirit and scope of the underlying inventive principles.

A. Relevance Analysis Device

Although a location at which and an object in which to install the relevance analysis device **20** are not specifically mentioned in the examples described above, the relevance analysis device **20** may be mounted in a vehicle as part of a car navigation system, or mounted in a portable type of information terminal such as a smartphone, for example.

The electronic constituent elements described above are merely functional concepts, and need not be physically configured as illustrated in the drawings. That is, the specific form of division/integration of each portion is not limited to that shown in the drawings. The constituent elements, as a whole or in part, can be divided and/or integrated in any manner either functionally or physically based on various types of loads or use conditions. For example, some functions of the relevance analysis device **20** may be provided in the server **10** or a terminal, and various processing may be performed by the relevance analysis device **20** communicating with the server **10** or the terminal as necessary.

B. Relevance Analysis Process

In the examples described above, as an example, the route specification unit **22***c* specifies the shortest route having an origin that is the analysis reference user and an end that is the

analysis target user. However, the route specification unit **22***c* may specify a route other than the shortest route.

In the examples described above, the mutual relevance between the analysis reference user and the analysis target user is specified based on the following: the number of component routes that constitute a route having an origin that is the analysis reference user and an end that is the analysis target user; whether the origin-side user is registered as a target viewed user by the end-side user on each component route; and the quantity of information provided by the origin-side user addressed to the end-side user on each route-constituting component route. However, other indices may also be utilized to specify the mutual relevance between the analysis reference user and the analysis target user. For example, the statement index may become larger (i.e., a higher relevance may be specified) as the frequency at which information is provided by the origin-side user addressed to the end-side user on each route-constituting component route increases. Alternatively, the registration index may become larger (i.e., a lower relevance may be specified) as the total number of other users registering a user as a target viewed user on each route-constituting component route increases, because the connection between the individual users is considered more tenuous.

According to the third example described above, the relevance specification unit **22***d* calculates the following for each component route, among the component routes that constitute a route, with the origin-side user and the end-user providing information to the server **10** addressed to each other: (quantity of information provided by origin-side user to server **10** addressed to end-side user)/(quantity of all information provided by origin-side user to server **10** addressed to other users). The total sum of the calculated values is the statement index. However, the statement index may be calculated using another method. For example, the relevance specification unit **22***d* may calculate the following for each component route, among the component routes that constitute a route, with the origin-side user and the end-user providing information to the server **10** addressed to each other: [(quantity of information provided by origin-side user to server **10** addressed to end-side user)+(quantity of information provided by end-side user to server **10** addressed to origin-side user)]/ [(quantity of all information provided by origin-side user to server **10** addressed to other users)+(quantity of all information provided by end-side user to server **10** addressed to other users)]. The total sum of the calculated values is the statement index. In such case, according to the example of FIG. **11**, for the route from the origin A to the end C, the component route between A and B is a component route for which the origin-side user and the end-side user provided information to the server **10** addressed to each other. On the component route between A and B, 20 is the quantity of information provided by the origin-side user A to the server **10** addressed to the end-side user B, 20 is the quantity of information provided by the end-side user B to the server **10** addressed to the origin-side user A, 50 is the quantity of all information provided by the origin-side user A to the server **10** addressed to other users, and 50 is the quantity of all information provided by the end-side user B to the server **10** addressed to other users. Therefore, the statement index of the route from the origin A to the end C is calculated as (20+20)/(50+50)=0.4. Meanwhile, for the route from the origin A to the end F, there is no component route for which the origin-side user and the end-side user provided information to the server **10** addressed to each other. Therefore, the statement index is calculated as zero.

What is claimed is:

1. A relevance analysis device that analyzes a mutual relevance between a plurality of users utilizing a server that allows users to view information provided by target viewed users, the relevance analysis device comprising:

a processor that:

specifies out of the plurality of users an analysis reference user who serves as a reference for analysis, and an analysis target user who serves as a target for analysis of relevance to the analysis reference user;

acquires from the server identification information that uniquely identifies the user, and registration information for specifying the target viewed user registered by the user;

based on the identification information and the registration information, specifies a route that spans between the analysis reference user and the target viewed user, the specified route being constituted from at least one component route, the specified route having an origin that corresponds to the analysis reference user and an end that corresponds to the analysis target user, each component route of the specified route having a relationship in which an end-side user of the component route is registered as the target viewed user by an origin-side user of the component route;

specifies a number of the component routes that constitute the specified route;

for each of the component routes that constitute the specified route, specifies whether the origin-side user is registered as a target viewed user by the end-side user based on the identification information and the registration information; and

specifies the mutual relevance between the analysis reference user and the analysis target user based on the specified number of the component routes and based on the number of the component routes in which the origin-side user is registered as a target viewed user by the end-side user.

2. The relevance analysis device according to claim **1**, wherein the processor:

specifies a higher mutual relevance between the analysis reference user and the analysis target user as the number of the component routes decreases; and

specifies a higher mutual relevance between the analysis reference user and the analysis target user as the number of the component routes in which the origin-side user is registered as a target viewed user by the end-side user increases.

3. The relevance analysis device according to claim **2**, wherein the processor:

when specifying the number of the component routes, counts as zero each of the component routes with the origin-side user registered as a target viewed user by the end-side user.

4. The relevance analysis device according to claim **1**, wherein the processor:

acquires, from the server together with the identification information and the registration information, provision quantity information that specifies a quantity of information provided by each of the users on the specified route;

for each of the component routes, specifies a quantity of information provided by the origin-side user addressed to the end-side user based on the provision quantity information; and

specifies the mutual relevance between the analysis reference user and the analysis target user based on the specified quantities.

5. The relevance analysis device according to claim **1**, wherein the processor selects the analysis target user based on a keyword search.

6. The relevance analysis device according to claim **1**, wherein the processor:

selects a plurality of the analysis target users based on a keyword search;

specifies the mutual relevance between the analysis reference user and each of the plurality of the analysis target users; and

communicates the specified relevance of each of the plurality of the analysis target users to a user of the relevance analysis device.

7. The relevance analysis device according to claim **1**, wherein the specified relevance of each of the plurality of the analysis target users is displayed on a display in the form of a list, the list being presented in an order based on the specified relevance of each of the plurality of the analysis target users.

8. A relevance analysis method that analyzes a mutual relevance between a plurality of users utilizing a server that allows users to view information provided by target viewed users, the relevance analysis method comprising:

specifying out of the plurality of users an analysis reference user who serves as a reference for analysis, and an analysis target user who serves as a target for analysis of relevance to the analysis reference user;

acquiring from the server identification information that uniquely identifies the user, and registration information for specifying the target viewed user registered by the user;

based on the identification information and the registration information, specifying a route that spans between the analysis reference user and the target viewed user, the specified route being constituted from at least one component route, the specified route having an origin that corresponds to the analysis reference user and an end that corresponds to the analysis target user, each component route of the specified route having a relationship in which an end-side user of the component route is registered as the target viewed user by an origin-side user of the component route;

specifying a number of the component routes that constitute the specified route;

for each of the component routes that constitute the specified route, specifying whether the origin-side user is registered as a target viewed user by the end-side user based on the identification information and the registration information; and

specifying the mutual relevance between the analysis reference user and the analysis target user based on the specified number of the component routes and based on the number of the component routes in which the origin-side user is registered as a target viewed user by the end-side user.

9. The relevance analysis method according to claim **8**, further comprising:

specifying a higher mutual relevance between the analysis reference user and the analysis target user as the number of the component routes decreases; and

specifying a higher mutual relevance between the analysis reference user and the analysis target user as the number of the component routes in which the origin-side user is registered as a target viewed user by the end-side user increases.

10. The relevance analysis method according to claim **9**, further comprising:

when specifying the number of the component routes, counting as zero each of the component routes with the origin-side user registered as a target viewed user by the end-side user.

11. The relevance analysis method according to claim **8**, further comprising

acquiring, from the server together with the identification information and the registration information, provision quantity information that specifies a quantity of information provided by each of the users on the specified route;

for each of the component routes, specifying a quantity of information provided by the origin-side user addressed to the end-side user based on the provision quantity information; and

specifying the mutual relevance between the analysis reference user and the analysis target user based on the specified quantities.

12. The relevance analysis method according to claim **8**, further comprising:

selecting the analysis target user based on a keyword search.

13. The relevance analysis method according to claim **8**, further comprising:

selecting a plurality of the analysis target users based on a keyword search;

specifying the mutual relevance between the analysis reference user and each of the plurality of the analysis target users; and

communicating the specified relevance of each of the plurality of the analysis target users to a user of the relevance analysis device.

14. The relevance analysis method according to claim **8**, further comprising:

displaying the specified relevance of each of the plurality of the analysis target users on a display in the form of a list, the list being presented in an order based on the specified relevance of each of the plurality of the analysis target users.

15. A non-transitory computer-readable storage medium storing a computer-executable relevance analysis program that analyzes a mutual relevance between a plurality of users utilizing a server that allows users to view information provided by target viewed users, the relevance analysis program comprising:

instructions for specifying out of the plurality of users an analysis reference user who serves as a reference for analysis, and an analysis target user who serves as a target for analysis of relevance to the analysis reference user;

instructions for acquiring from the server identification information that uniquely identifies the user, and registration information for specifying the target viewed user registered by the user;

instructions for, based on the identification information and the registration information, specifying a route that spans between the analysis reference user and the target viewed user, the specified route being constituted from at least one component route, the specified route having an origin that corresponds to the analysis reference user and an end that corresponds to the analysis target user, each component route of the specified route having a relationship in which an end-side user of the component route is registered as the target viewed user by an origin-side user of the component route;

instructions for specifying a number of the component routes that constitute the specified route;

instructions for, for each of the component routes that constitute the specified route, specifying whether the origin-side user is registered as a target viewed user by the end-side user based on the identification information and the registration information; and

instructions for specifying the mutual relevance between the analysis reference user and the analysis target user based on the specified number of the component routes and based on the number of the component routes in which the origin-side user is registered as a target viewed user by the end-side user.

16. The storage medium according to claim **15**, the program further comprising:

instructions for specifying a higher mutual relevance between the analysis reference user and the analysis target user as the number of the component routes decreases; and

instructions for specifying a higher mutual relevance between the analysis reference user and the analysis target user as the number of the component routes in which the origin-side user is registered as a target viewed user by the end-side user increases.

17. The storage medium according to claim **16**, the program further comprising:

instructions for, when specifying the number of the component routes, counting as zero each of the component routes with the origin-side user registered as a target viewed user by the end-side user.

18. The storage medium according to claim **15**, the program further comprising

instructions for acquiring, from the server together with the identification information and the registration information, provision quantity information that specifies a quantity of information provided by each of the users on the specified route;

instructions for, for each of the component routes, specifying a quantity of information provided by the origin-side user addressed to the end-side user based on the provision quantity information; and

instructions for specifying the mutual relevance between the analysis reference user and the analysis target user based on the specified quantities.

19. The storage medium according to claim **15**, the program further comprising:

instructions for selecting the analysis target user based on a keyword search.

20. The storage medium according to claim **15**, the program further comprising:

instructions for selecting a plurality of the analysis target users based on a keyword search;

instructions for specifying the mutual relevance between the analysis reference user and each of the plurality of the analysis target users; and

instructions for communicating the specified relevance of each of the plurality of the analysis target users to a user of the relevance analysis device.

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